Appl. No. : **10/061,438**
Filed : **January 31, 2002**

AMENDMENTS TO THE CLAIMS

1-40. (Cancelled)

41. (Currently amended) A method for determining a ratio of an amount of a glycated form of a protein to ~~total~~ a total amount of the protein in a sample containing both glycated and nonglycated forms of the protein, comprising:

providing a solid support having negatively charged carboxyl groups immobilized thereon, which groups are capable of binding both the glycated and the nonglycated forms of the protein at a first pH, said support also having hydroxyboryl groups immobilized thereon, interspersed with the negatively charged carboxyl groups, which hydroxyboryl groups are capable of binding the glycated form of the protein at a second pH;

adding the sample to the solid support at the first pH, thereby binding both the glycated and the nonglycated forms of the protein to the negatively charged carboxyl groups on the solid support, and then performing a first measurement indicative of the total amount of the glycated and the nonglycated forms of the protein bound to the solid support;

changing the pH on the support to the second pH, thereby removing both the nonglycated form of the protein and the glycated form of the protein from the negatively charged carboxyl groups, after which removal the glycated form of the protein immediately binds to the hydroxyboryl groups on the solid support independent of incubation time, and then performing a second measurement indicative of the amount of the glycated form of the protein bound to the solid support; and

determining the ratio of the amount of the glycated form of the protein to ~~total~~ the total amount of the glycated and the nonglycated forms of the protein in the sample from the first and second measurements.

42. (Previously presented) The method of Claim 41, wherein the first pH is achieved by applying a buffer of about pH 5.0 to 7.0.

43. (Previously presented) The method of Claim 41, wherein the second pH is achieved by applying a buffer of about pH 8.0 to 10.0.

44. (Previously presented) The method of Claim 41, wherein the glycated protein is hemoglobin.

45. (Previously presented) The method of Claim 41, wherein the glycated protein is albumin.

46. (Previously presented) The method of Claim 41, wherein the sample comprises blood.

47. (Previously presented) The method of Claim 41, wherein the sample comprises serum.

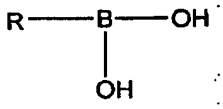
48. (Previously presented) The method of Claim 41, wherein the sample comprises plasma.

49. (Previously presented) The method of Claim 41, wherein the first and second measurements measure an optical property of the protein.

50. (Previously presented) The method of Claim 41, wherein the first and second measurements are optical readings at a predetermined wavelength.

51. (Previously presented) The method of Claim 41, wherein the first and second measurements measure a protein label.

52. (Previously presented) The method of Claim 41, wherein the hydroxyboryl group is of the type



where R is selected from the group consisting of phenyl, alkyl of 1-6 carbons, ethyl, 1-propyl, 3-methyl-1-butyl and aminophenyl.

53. (Cancelled)

54. (Previously presented) The method of Claim 41, wherein the solid support is selected from the group consisting of cellulose, nitrocellulose, cellulose acetate, polyacrylamide, agarose polyacrylamide copolymer, agarose, starch, nylon, nylon polyesters, dextran, cross-linked dextran, dextran acrylamide copolymer, cross-linked hydroxyethylmethacrylate, substituted cross-linked polystyrenes, polyvinylalcohol, wool, metal oxides, porous ceramics coated with hydrophilic organic polymers and glass.

55. (Cancelled)

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56. (Currently amended) A method for determining a ratio of an amount of glycated albumin to a total ~~protein~~ amount of glycated and nonglycated albumin in a sample containing both glycated and nonglycated ~~protein~~ albumin, comprising:

providing a strip-type device comprising:

(1) a solid support matrix having a measurement area; and

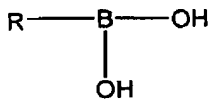
(2) negatively charged carboxyl groups and dihydroxyboryl groups immobilized and interspersed on the solid support matrix, said negatively charged carboxyl groups are capable of binding both glycated and nonglycated ~~protein~~ albumin at a first pH between about 5.0 and about 7.0, and said dihydroxyboryl groups are capable of binding glycated ~~protein~~ albumin at a second pH between about 8.0 and about 10.0;

adding the sample to the solid support matrix at the first pH, thereby binding both glycated and nonglycated ~~protein~~ albumin to the negatively charged carboxyl groups on the solid support matrix, and then performing a first optical measurement on the measurement area indicative of the total ~~protein~~ amount of glycated and nonglycated albumin bound to the solid support matrix;

changing the pH on the solid support matrix to the second pH, thereby removing both the nonglycated ~~protein~~ albumin and the glycated ~~protein~~ albumin from the negatively charged carboxyl groups, after which removal the glycated ~~protein~~ albumin immediately binds to the dihydroxyboryl groups on the solid support matrix independent of incubation time, and then performing a second optical measurement on the measurement area indicative of the amount of glycated albumin bound to the solid support matrix; and

determining the ratio of the amount of glycated albumin to the total ~~protein~~ amount of glycated and nonglycated albumin in the sample from the first and second optical measurements.

57. (Previously presented) The method of Claim 56, wherein said dihydroxyboryl groups have the formula:



where R is selected from the group consisting of phenyl, alkyl of 1-6 carbons, ethyl, 1-propyl, 3-methyl-1-butyl and aminophenyl.

58. (Previously presented) The method of Claim 56, wherein the solid support matrix is selected from the group consisting of cellulose, nitrocellulose, cellulose acetate, polyacrylamide, agarose polyacrylamide copolymer, agarose, starch, nylon, nylon polyesters, dextran, cross-linked dextran, dextran acrylamide copolymer, cross-linked hydroxyethylmethacrylate, substituted cross-linked polystyrenes, polyvinylalcohol, wool, metal oxides, porous ceramics coated with hydrophilic organic polymers and glass.

59. (Previously presented) The method of Claim 58, wherein said solid support matrix is carboxy cellulose.

60. (Previously presented) The method of Claim 56, wherein said first pH is achieved with a buffer selected from the group consisting of MES, MOPS and HEPES.

61. (Previously presented) The method of Claim 56, wherein said second pH is achieved with a buffer selected from the group consisting of ammonium acetate or taurine.

62. (Previously presented) The method of Claim 56, wherein the sample comprises blood, plasma or serum.

63. (Currently amended) A method for determining a ratio of an amount of glycated hemoglobin to a total ~~protein~~ amount of glycated and nonglycated hemoglobin in a sample containing both glycated and nonglycated ~~protein~~ hemoglobin, comprising:

providing a strip-type device comprising:

(1) a solid support matrix having a measurement area; and

(2) negatively charged carboxyl groups and dihydroxyboryl groups immobilized and interspersed on the solid support matrix, said negatively charged carboxyl groups are capable of binding both glycated and nonglycated ~~protein~~ hemoglobin at a first pH between about 5.0 and about 7.0, and said dihydroxyboryl groups are capable of binding glycated ~~protein~~ hemoglobin at a second pH between about 8.0 and about 10.0;

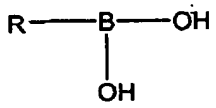
adding the sample to the solid support matrix at the first pH, thereby binding both glycated and nonglycated ~~protein~~ hemoglobin to the negatively charged carboxyl groups on the solid support matrix, and then performing a first optical measurement on the

measurement area indicative of the total ~~protein~~ amount of glycated and nonglycated hemoglobin bound to the solid support matrix;

changing the pH on the solid support matrix to the second pH, thereby removing both the nonglycated ~~protein~~ hemoglobin and the glycated ~~protein~~ hemoglobin from the negatively charged carboxyl groups, after which removal the glycated ~~protein~~ hemoglobin immediately binds to the dihydroxyboryl groups on the solid support matrix independent of incubation time, and then performing a second optical measurement on the measurement area indicative of the amount of glycated ~~protein~~ hemoglobin bound to the solid support matrix; and

determining the ratio of the amount of glycated ~~protein~~ hemoglobin to the total ~~protein~~ amount of glycated and nonglycated hemoglobin in the sample from the first and second optical measurements.

64. (Previously presented) The method of Claim 63, wherein said dihydroxyboryl groups have the formula:



where R is selected from the group consisting of phenyl, alkyl of 1-6 carbons, ethyl, 1-propyl, 3-methyl-1-butyl and aminophenyl.

65. (Previously presented) The method of Claim 63, wherein the solid support matrix is selected from the group consisting of cellulose, nitrocellulose, cellulose acetate, polyacrylamide, agarose polyacrylamide copolymer, agarose, starch, nylon, nylon polyesters, dextran, cross-linked dextran, dextran acrylamide copolymer, cross-linked hydroxyethylmethacrylate, substituted cross-linked polystyrenes, polyvinylalcohol, wool, metal oxides, porous ceramics coated with hydrophilic organic polymers and glass.

66. (Previously presented) The method of Claim 63, wherein said solid support matrix is carboxy cellulose.

67. (Previously presented) The method of Claim 63, wherein said first pH is achieved with a buffer selected from the group consisting of MES, MOPS and HEPES.

68. (Previously presented) The method of Claim 63, wherein said second pH is achieved with a buffer selected from the group consisting of ammonium acetate or taurine.

69. (Previously presented) The method of Claim 63, wherein the sample comprises blood, plasma or serum.